

CLAIMS

What is claimed is:

5 1. A composition comprising carbonized cellulose beads of reconstituted cellulose, wherein the beads each have a surface area of about 4 m/g, an apparent density of between about 0.56 g/cm³ and about 0.58 g/cm³, and a specific gravity of less than about 2.

10 2. The composition of claim 1 wherein the carbonized cellulose beads further comprise metal, metal alloy, or metal oxide clusters attached to the surface of the beads.

15 3. The composition of claim 2 wherein the clusters further comprise a tin-antimony alloy.

4. The composition of claim 3 wherein the tin-antimony alloy clusters comprise at least about 50 percent by weight of the carbonized cellulose beads.

20 5. The composition of claim 3 wherein the tin-antimony alloy clusters comprise at least about 50 percent by weight of the carbonized cellulose beads.

25 6. The composition of claim 2 wherein the clusters further comprise iron.

7. The composition of claim 2 wherein the clusters further comprise a composition selected from the group consisting of iron, tin-antimony alloy, platinum, rhodium, palladium, nickel, and cobalt.

30 8. A method for producing carbonized cellulose beads comprising:
(a) providing reconstituted cellulose beads;
(b) drying the reconstituted cellulose beads; and

(c) pyrolyzing the reconstituted cellulose beads by heating the beads in an inert atmosphere at a temperature sufficient to pyrolyze the beads without causing significant crystallization of the beads.

5 9. The method of claim 8 wherein the reconstituted cellulose beads range from about 0.6 to about 2 microns in diameter, and are substantially free of pores on their surface.

10 10. The method of claim 8 wherein the reconstituted cellulose beads further comprise Orbicell® cellulose beads.

11. The method of claim 9 wherein the inert atmosphere is provided by streaming nitrogen gas over the beads while the beads are heated.

15 12. The method of claim 9 wherein the beads are heated to a temperature of not greater than about 650°C.

20 13. A composition comprising carbonized cellulose beads made according to the method of claim 8.

14. A composition comprising carbonized cellulose beads made according to the method of claim 9.

25 15. A composition comprising an anode material comprising carbonized cellulose beads.

30 16. The composition of claim 15 wherein the carbonized cellulose beads further comprise metal, metal alloy, or metal oxide clusters attached to the surface of the beads.

17. The composition of claim 16 wherein the clusters further comprise a tin-antimony alloy.

18. The method of using carbonized cellulose beads as an electrode material in a battery.

5 19. The method of claim 18 wherein the battery is selected from the group consisting of lithium-ion, magnesium-ion, and zinc/air batteries.